

**ABSTRACT**

The present invention relates to a unique process for production of titanium concentrate with low contents of radionuclide elements from anatase mechanical concentrates. This high TiO<sub>2</sub> containing concentrate is essentially directed for the chloride process of titanium dioxide pigment manufacture. The process here described basically involves processing anatase mechanical concentrates through the following sequence of unit operations: calcination in air and reduction with hydrogen or any other reducing gas, both in fluidized bed reactor or rotary kiln, low-intensity magnetic separation of the reduced product, high-intensity magnetic separation of the non-magnetic fraction resulting from the low-intensity magnetic separation, hydrochloric acid leaching of the product of high-intensity magnetic separation, filtering and dewatering of the leached product, high temperature oxidation of the dewatered material under a continuous flow of air or oxygen and in the presence of a mixture of sodium fluoride (NaF) and amorphous silica (SiO<sub>2</sub>), fast cooling of the oxidized ore, hydrochloric acid leaching of the oxidation product in the presence of sodium fluoride, filtration and drying of the product of the second leaching and high intensity magnetic separation, the non-magnetic fraction of this final magnetic separation becoming the end product. The process features changes in the currently known sequence of steps, improvement in practically all unit operations involved and an unique use of mechanisms of radionuclide removal.